



# EBOLA IN CONTEXT: UNDERSTANDING TRANSMISSION, RESPONSE AND CONTROL

## WEEK 1 STEP 1.17 TRANSMISSIBILITY: HOW DO WE MEASURE INFECTIOUSNESS? (VIDEO)

**This lecture introduces two measures that describe infectiousness: the secondary attack rate and the case reproduction number.**

The **secondary attack rate (2° AR)** is the proportion of those exposed to the primary case that develop disease as a result of the exposure. It only applies to person-to-person transmission. It will vary depending on the context (closeness and type of contact), as well as the disease. It can be estimated in situations in which the number of contacts is known, such as households or schools. For example, if 10 people in a household are exposed to the primary case and 2 get ill the secondary attack rate would be 2/10 or 20%.

The **basic case reproduction number,  $R_0$**  (R nought, pronounced “R nort”), is the average number of secondary cases per case in a totally susceptible population. As an infection spreads in a population some people become immune. The **net case reproduction number,  $R$** , is the average number of secondary cases per case at a particular time, depending on the proportion of the population that is still susceptible.

$R_0$  depends on 3 factors:

- duration of infectiousness
- probability of infection being transmitted per contact between a susceptible and infected individual
- average rate of contact between susceptible and infected individuals.

It therefore varies not just from disease to disease, but between populations and in the same population over time, depending on the contact patterns.

To understand the difference between  $R_0$  and secondary attack rate, imagine you have one person with a new disease coming in contact with 10 people. That one person infects three people who then become ill. In that situation the secondary attack rate would be 3/10 (30%). The estimate of  $R_0$  would be 3: the one case has given rise to 3 further cases.

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